Welcome to the webinar for the Partnerships for Innovation: Building Innovation Capacity Program. This presentation addresses the competition for FY 2015 funds. I am Sara Nerlove, the program director for PFI:BIC .

This slide presentation will be available including the Note Pages on the PFI:BIC web page, so as to provide more information or for further review.

--You will be able to obtain further information and clarifications, whether or not you have been able to attend the webinar--

What is PFI:BIC?

- An academe-industry partnership led by an interdisciplinary academic research team collaborating with an least one industry partner in order to carry out research to:
  - advance, adapt, and integrate technology into a specified human-centered smart service system.
- The objective is to create or transform a "smart(er)" service system that has the potential for significant social and economic impact.

What is key?

- **Originality**
- **Interdisciplinary collaboration** (=transdisciplinary—to make this concept even more emphatic, moving such engagement toward true convergence)
- **Value-added to humans** (included are not only users, but recipients, beneficiaries, providers and/or decision makers utilizing the information and capability provided by the service)

--Underpinnings are **research discovery findings**—what knowledge can be added/integrated/translated into the partnership to contribute to the project context? What is the state-of-the art and the competitive landscape? While you need to look ahead, your thinking must be grounded. A strong case for the project must be rooted in current science and engineering knowledge.

--Integration, of course, with all the interdisciplinary considerations that come into play, will require adaptations and modifications and overcoming various obstacles. It may be the case, that there are some important research "holes" that can and must be filled to proceed in the interest of real-world implementation.

--**Two perspectives** are joined at a formative stage in a **highly** interactive collaborative partnership: academe and business.

Thus, by their very nature, PFI:BIC "smart" service projects are not only interdisciplinary, they are also cross-organizational.

--What obstacles in transforming or creating the "smart" service system must be overcome? Do the research tasks make clear that important problems are being tackled?

In regard to the PFI-BIC program, Engineering has partnered with Computer and Information Science and Engineering (CISE), and CISE is participating in the support of this program. .

Above are the five (5) additional Cognizant NSF Program Officers associated with this program. They are listed in the Solicitation under Summary of Program Requirements, General Information and under VIII Agency Contacts.

These program officers can help answer your questions, particularly those relating to efforts with a technology-basis and/or an application area relevant to research communities with which they are conversant. You may want to consult with one or more of these other cognizant program officers regarding the nature of the "smart" service system that you have mind.

Note that each academic institution may submit two proposals as a lead institution, preferably involving distinct application areas. There is no restriction on an institution's participation as a subawardee on other PFI:BIC proposals.

No. of Awards & Program Funding -- is always subject to actual funding available

Submitter restrictions -- the idea is that leadership responsibility for <u>one</u> of these types of partnership projects requires a particularly major effort. Note that important leadership for these projects comes out of the academic institution.

For a PI on an active PFI:BIC award -- note that it is OK for the current awardee to be PI on a current award at the time of submission, but that award's performance period

must end by the 30th of September 2015.

Building Capacity implies an ongoing capability that can continue to grow and develop

Let's elaborate about humans here—the humans in the partnership rather than those in the service system.

Expected Outcomes: "Takeaways" for faculty, students, and industrial partners:

Takeaways are defined as capabilities, competencies, or more tangible items that one can move forward with—contrasts with the more passive concept of "benefits"

There are takeaways for the faculty, students, other researchers, and industrial partners—everyone should be slated to win here and be able to carry on in a way that has been changed by the project. "Takeaways" are simply more than what you receive—the concept describes lively and dynamic outcomes. These "takeaways" not only may be important in continuing the work of this project but also in the context of other innovation research in different partnership contexts in the future.

--With regard to industrial partner(s): the potential to contribute to the ability to thrive and/or to grow.

--With regard to faculty: increased agility in adapting research in the interest of moving to market-valued solutions.

--With regard to students: the aim is for the project to have an indelible effect on the students who participate. Student involvement is essential, but note that these projects are research projects and are not focused directly on education. Students should get important added education directly through participation in the project.

Here we turn to talking about the Service System Innovation Capacity: A service system can be seen as a socio-technical system

– **Configurations of people, technologies, organizations, and information designed to deliver services that create and deliver value.**

– **A full understanding of the socio-technical system will require interdisciplinary teams to build the innovation capacity of the system. One needs to understand the technology, the organizations, and the people.**

In the context of service system innovation capacity, technological innovation capacity and human innovation capacity must be combined in various ways.

A salient question to ask is, why has such a system not been brought to fruition earlier?

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Successful Integration into a Smart Service System Requires a Range of Disciplines in Addition to those Related to the Technology

(1) Systems Engineering or Engineering Design
- To provide knowledge of service system design and system integration issues.

(2) Computer Science/Information Technology
- To provide knowledge of considerations involving data transfer, communication and/or data processing needed for successful integration of the technology into a "smart" service system.

(3) Human Factors/Behavioral Science/Cognitive Engineering
- To provide knowledge of the potential effects of human factors as they interact with the technology proposed. These findings will have an impact on ensuring that the design of the "smart" service system is human-centered.

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- **((1) above) In addition to providing systems understanding, engineers in different areas can play a role in the technology development and/or ((2), above) data processing requirements, etc.**

- **In short, the role of individual partners may be tied to one of the "3 categories" of coverage needed to build the system and/or these partners or others may play other roles vis-à-vis the project.**

- To ensure the success of the project, it is important to include the range of the interdisciplinary skills and experiences required of the partnership as a whole.
- These capabilities can come from the academic or the industrial side to carry out the project.
  - Some individuals may cover more than one of these skill sets.
- There is also flexibility as to how the interdisciplinary coverage can be achieved.
  - e.g., by experience and accomplishments vs. as strictly reflected by the fields of Ph. D degree or department affiliation, etc.

In other words, the expertise and experience of the team of people as a whole must cover a range of disciplines.

Partnership Requirements

- A minimum partnership is composed of:
  - Lead academic institution researchers
  - One industrial partner (of *any size*: large or small) with commercial revenues (Note, there can be other primary partners)
- *All* partners must have an explicit signed commitment (stated in the partnership letter on letterhead)
  - Types of commitment: financial or in-kind
  - If a partner qualifies as small business, and it also has a subaward, commitment must be over and above subaward compensation
    - ➢ Note: Any organization that is designated to receive funds as a subawardee must be registered in FastLane—check out NEW PLAYERS!
- Other partnering—no specific requirements, but it is likely that other partners (or additional expertise within the academic team) might be needed;
  - e.g., explicit expertise in "smart" service systems and/or to cover the required range of disciplines in the three designated categories of the project
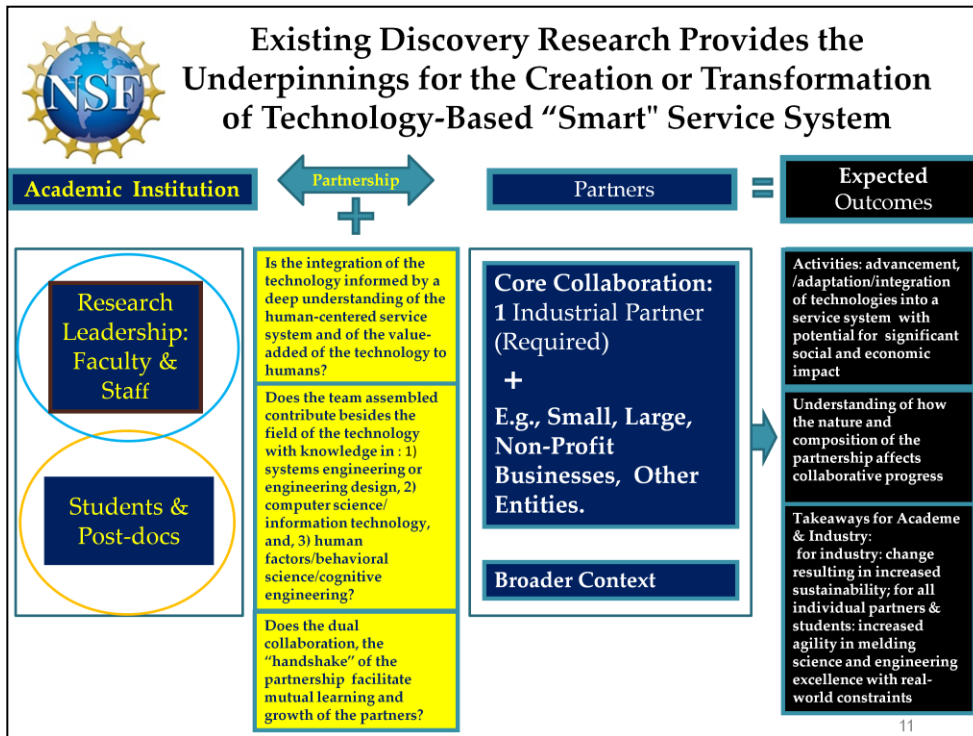
The constraint on the industrial partner only pertains to one partner that is designated to fulfill the minimum partnership. (Other primary partners may or may not meet this constraint—they need not be industrial nor produce commerical revenues.)

The inclusion in the partnership of any organizational entities over and above the minimum partnership requirements is up to the proposer and is not subject to the eligibility constraints of having commercial revenues. The power of joining the perspectives of academe and industry is an important element of responsive proposals. A partnership entails interaction integral to the effort; it is more than a division of labor, technical assistance, or consulting.

Note that strong, meaningful working relationships between the academic research team and the other partners are not likely to have been "born yesterday".

Other partners may be for-profit, not-for-profit, additional industrial partners (either large or small), additional academic institutions, consultants, or government entities. These can belong to the primary members of the partnership or to the broader context. For example, those in the broader context may be in an advisory capacity or fulfill limited or special roles. If you elect to have additional broader partners, these partners are also required to provide signed commitment letters on letterhead.

Regarding global partnerships: what is important in choosing partners is to view the PFI:BIC partnership project as clearly intended to be a win-win for the U.S. While no funds can go directly to international company offices, the global firm is benefitting from a research context enabled by U.S. tax dollars. So choose carefully, use your judgment, and describe the situation. Note too that the solicitation expresses interest in the U.S. service economy (a large part of our economy)--becoming "smart" or smarter, based on research discoveries.

Existing Discovery Research Provides the Underpinnings for the Creation or Transformation of Technology-Based "Smart" Service System

An academe-industry partnership for which existing discovery research provides the underpinnings for the creation or transformation of a technology-based human-centered "smart(er)" service system that has potential for significant economic/societal impact.

There are key questions proposers need to ask themselves to assess the suitability of the research project

Is the integration of the technology informed by a deep understanding of the human-centered service system and of the value-added of the technology to humans?

Does the team assembled contribute besides the field of the technology with knowledge in : 1) **systems engineering or engineering design, 2) computer science/ information technology, and, 3) human factors/behavioral science/cognitive engineering?**

Does the dual collaboration, the "handshake" of the partnership, facilitate mutual learning and growth of the partners?

Cooperative Research Agreements (CRAs)

- CRAs for this project:

  - Between the lead institution and the industrial partner(s) as well as with any other partners for which a CRA is relevant.

  - Provide <u>one signed</u> document that can cover/include all agreements or provide <u>multiple signed</u> documents

  - Distinguish Cooperative Research Agreements (CRAs) from Cooperative Agreements (CAs) referred to in Section VII. B. of the Solicitation

Think ahead, eliminate surprises, and foster lasting, amicable relationships

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This slide and the next provide information about Cooperative Research Agreements (CRAs).

At the time of proposal submission, all that is needed is a letter from the lead institution stating that CRAs <u>will be provided at the time of recommendation for an award.</u>

I include CAs in the notes because in the past there has been confusion. The CRAs called for in PFI:BIC have nothing to do with NSF CAs.

There are actually 3 references to CAs (Cooperative Agreements in every solicitation. These are standard mechanisms in addition to grants for NSF funding.

The (CAs) Cooperative Agreements referred to in Section VII. B of the Solicitation are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions.

Timing: CRAs will need to be submitted to NSF in a timely manner upon request (at the time of consideration of recommendation for award)

- In order for a recommended award to move through the internal review process
- Without completed CRAs (with electronic copies sent to NSF), there can be **no award**
  - Draft CRAs early or, at least, think these through early
  - Know about fees (if any), review time for approval, the situation with regard to the legal offices of large companies (vs. individuals from those companies with whom you may be directly working, know, and trust, etc.)
  - Provide CRAs in a timely fashion upon notification that the program is considering a recommendation for award
  - A notification is a communication from the program director within days or weeks of the peer review panel meeting

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It goes without saying that fully executed CRAs must be signed by all relevant parties.

Timing is of the essence—

Begin by sitting down with your partners early, prepare your LOI early, prepare your proposal early, and concern yourselves with the what-ifs of the CRA (singular or plural) early. These are likely to involve university personnel and industry personnel with whom you are not directly working on the tasks of your project—e.g., you may not be familiar with the ins and outs of legal departments

Partnership proposals need input from all partners, their cognizance of the entire project plan, and an opportunity for them to vet at least an advanced draft of the proposal—from time to time, the partners indeed may participate directly in some of the writing. If the partners are conversant with the project as described in the proposal, then all those partner organizations which are participating in the signing of CRAs will be better able to appropriately anticipate and have a plan for dealing with issues which may arise.

It is of vital importance not to underestimate the twists and turns in submitting a PFI:BIC partnership proposal involving many participants, not the least of these are traffic and other possible

bottlenecks on the FastLane side of the equation.

Highlights for Discussion

- **Need for preliminary data**
  - These projects might need to achieve a balance between seeking the answers to significant questions in order to adapt the existing technology for integration into this new service context and having obtained enough preliminary data to be convincing that the direction has potential

  - **Be informed about the competitive landscape & markets for the smart service system**

--<u>Preliminary Data</u>: Remember, the case for every project needs to have important grounding in science and engineering

--Although this work is in the post-discovery and pre-commercialization space, it is important to be well versed on what is out there and what is possible now.

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Highlights for Discussion
(cont'd)

- **Other additional review criteria**
  - The promise of the technology to be advanced, adapted, and **integrated into a smart service system** that has the potential for social and economic impact.
  - The value of the research tasks to be carried out, **including those that consider human factors**, to advance, adapt, and integrate the technology into a smart service system.
  - The **quality of the primary partnership** (e.g., expertise, achievements, complementarities, commitment) as integral to the planning and execution of these activities
  - The likelihood that the **nature of the participation of students** and/or postdoctoral researchers in this culture of collaboration will prepare them to be future innovators.

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--Reference VI. NSF Processing and Review Procedures, A. Merit Review Principles and Criteria, **Additional Solicitation Specific Review Criteria**

-- Read these criteria when preparing your proposal – the peer-review panelists will be reading them!

- **Letter of Intent (LOI)**
  - Note: Concerns have been expressed about character limits; these are standard and not malleable; however, the space available under "Other Comments" can be used to include additional important data that does not fit elsewhere.
  - Include in the Letter of Intent (LOI) in your synopsis, the technology domain and area of application (service system) are provided
  - Read the additional information on LOI on the PFI:BIC

Reference: V. Proposal Preparation and Submission Instructions
A. Proposal Preparation Instructions, Letters of Intent (required)
and
http://www.nsf.gov/eng/iip/pfi/BIC_letterofintent.jsp

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Under Point of Contact for NSF Inquiries: Be sure to provide a current phone number (preferably a direct line that gets answered with regularity), an e-mail for the PI designated in the LOI, and the submitting department.

The potential importance of facilitating the ease of communication with the PFI:BIC program about the nature of the prospective proposal cannot be stressed enough!

Provide key words re: technology domain and area of application in the Other Comments section of your LOI; it provides a further sense of dimensions of the projects which is useful when composing review panels.

At NSF, proposers are routinely invited to suggest names of and provide contact information for persons whom they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal.

Bear in mind the interdisciplinary nature of the peer review panels for the PFI:BIC program and the ultimate concern of the program with implementation in the real world and with its potential for social and economic impact.

These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal.

Solicitation: NSF 14-610

Questions?

Questions may also be sent via email to:
snerlove@nsf.gov

The presentation with notes will be available following the WEBINAR
http://www.nsf.gov/eng/iip/innovation/BIC.jsp

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Parting words before questions: READ the Solicitation: Talking with me or writing to me is best done after you have done a lot of homework and have questions, rather than when you are seeking a more broad-gauged tutorial. My role is not really to advise you on the many matters where it must be your choice and your wisdom that are in line with what YOU think will be appropriate for your particular project and to make a strong case for the potential value of your project. <u>You will need first and foremost to convince a peer review panel</u>.

Let me say at this juncture that one of the cognizant program officers, Alexandra Medina-Borja, is an industrial and systems engineer, who has a background in service systems—but for her to be helpful to you, you need to have questions and concerns that arise AFTER "Smart" Service Systems 101. ("Smart" Services 101 is your pre-requisite via your partners' wisdom and/or any other means at your disposal.)

These slides including the Note Pages will be posted.

Solicitation: NSF 14-610

ADDITIONAL INFORMATION

What PFI: BIC is **NOT** ABOUT--reminder list (just to have it handy)

Some of the items below could occur and even be stimulated by or be by-products of the project, but they are not the focus per se of the project.

· education and building human capital by itself (e.g., producing cadres of entrepreneurs)

· building innovation capacity at the institutional level or the infrastructure for innovation

· development of an innovation ecosystem--other than crafting an elegant partnership for this project

· moving prototypes, products, processes or systems to commercialization

· creating companies (although this could happen in the course of this work)

· creating models of innovation or models of educating-to-innovate

· assistance to businesses

· contracting businesses to perform tasks for researchers

· research about new business models for the service industry. Participation of faculty from business schools and entrepreneurship programs or from centers of economic development if appropriate, can be incorporated to add value and/or to supply the expertise needed for the project but the project has to center on advancing and integrating a technology into a smart service system

All of these elements are valuable and certainly education is an integral part of the BIC projects in the form of mutual learning of the members of the primary group of partners as well as in the form of education and inspiration of the students who will be engaged in various ways in the context of the work of the partnership group.

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**Solicitation: NSF 14-610
More Highlights for Discussion**

- Budget justification
  - <u>Line-by-line explanation</u> of the budget items on the page for the <u>Cumulative Budget</u>
  - If any of those items have subcategories, break out these subcategories and then show a total corresponding to the total for the line item
  - For each consultant, provide a letter describing what each will be doing, daily rate, and time available. (Also, include under line item for Consultants in the Budget).

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I urge PIs to be very involved in reviewing their own budgets—budgets speak volumes. Delegation is fine, but in the end, this is a matter for which you need to be responsible--it can cost you, if you are not involved. Make it easy to digest your budget without having a calculator in hand.

How many students are involved vs. student years?—this may not always be possible to designate accurately, especially since the projects are three years.

PIs—think carefully when you choose a level of commitment to your project. While these projects involve coordination and delegation—these projects demand some serious direct intellectual leadership. The knowledge, experience, and savvy of the PI is of major importance here despite the need for a strong highly interdisciplinary team. In joining the perspectives of academe and industry—it is important to say that in general, the more each side of the equation also has knowledge of the other, the better. The PI needs to roll up his/her sleeves in integrating the cultures of these two worlds and in ensuring the smooth operation and flow of the partnership activities and knowledge exchange.

•Bio sketches for Partners

--From all main representatives and/or those playing explicit
research roles.

--Not a Co-PI (more common)

• If an industrial partner is not a Co-PI. Classify <u>him/or her as</u>
<u>*Senior Personnel*</u> , whether or not he/she is Senior Personnel on a
subaward

- Label Bio Sketches and Cross-Reference in Partner Letters

- Label top of each bio sketch: person's name, category of
participation (PI/Co-PI, Industry/Other Organization, and
Affiliation)

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Bottom Line re: What NSF and reviewers want to know:

--Who is participating from and/or importantly representing the lead institution and the partner organizations?

--What is the background and experience of each?

Most business partner participants are not official Co-PIs on the NSF proposal cover page—although that is an option in a number institutions. A business partner participant or one from another academic institution, however, can be made a Co-PI. Note the PI and all Co-PIs are classified as Senior Personnel.

See F. under guide to submission of a proposal: it contains information about Co-PIs, who are Senior personnel, as well Non-Co-PIs--who must be classified as Senior Personnel--so that bios for them can be submitted. <u>All</u> can submit their bios in the NSF separate bio-sketch module.

• **Cross-reference in the respective partnership letter that the bio-sketch for each of those designated as a participating individual (i.e., the main representatives and/or those playing explicit research roles) is located with those of the PI and Co-PIs. and has been submitted through the FastLane module.**

• <u>**Format/content can be adjusted to be relevant for individuals not in academe**</u>